Claims

What is claimed is:

1. A method for representing a three-dimensional scene using fixed point data, the method comprising the steps of:

determining a quantization transform corresponding to a geometric object, the geometric object representing at least a portion of the three-dimensional scene, the quantization transform useable for converting a floating point space to a fixed point space, wherein the floating point space contains one or more floating point data corresponding to the geometric object; and

converting, by using the quantization transform, the one or more floating point data to one or more fixed point data.

2. The method of claim 1, wherein the geometric object represents at least a portion of an object in a three-dimensional scene.

3. The method of claim 1, wherein the step of converting further comprises the steps of:

multiplying the quantization transform and the one or more floating point data to create temporary data in floating point; and

converting the temporary data to fixed point whole numbers.

4. The method of claim 1, wherein the step of determining a quantization transform further comprises the step of determining a bounding sphere defining extents of the floating point space represented by the geometric data in the three-dimensional scene, and wherein the one or more floating point data are contained within the bounding sphere.

5. The method of claim 4, wherein the step of determining a quantization transform further comprises the steps of:

determining extents of the bounding sphere; and

mapping the extents of the bounding sphere to data having values falling between first and second integer values.

6. The method of claim 5, wherein the step of determining extents of the bounding sphere further comprises the step of computing at least one minimum vertex value and at least one maximum vertex value for all geometric objects in at least a portion of the three-dimensional scene.

7. The method of claim 5, where the step of mapping uses a radius of the bounding sphere, a center of the bounding sphere, and minimum and maximum integer values.

8. The method of claim 1, wherein quantization transform comprises a scale factor and a translate factor.

9. The method of claim 1, further comprising the steps of:

computing a first transform comprising one or more of scale, rotate, and translate data;

computing an inverse of the first transform;

computing an inverse of the quantization transform;

concatenating the inverse of the quantization transform and the inverse of the first transform to create a second transform.

10. The method of claim 9, wherein the first transform is a ModelView transform or a concatenation of more than one ModelView transform.

11. The method of claim 9, further comprising the steps of:

converting one or more normals corresponding to the geometric object from floating point data to fixed point data; and

combining textures associated with the geometric object into a single texture map.

12. The method of claim 9, further comprising the steps of:

storing the one or more fixed point data in a quantized scene file; and

storing the second transform in the quantized scene file.

13. The method of claim 1, wherein the floating point data are vertices corresponding to the geometric object.

14. The method of claim 1, wherein the geometric object corresponds to a Geometry node of a scene graph.

15. An apparatus for representing a three-dimensional scene using fixed point data, the apparatus comprising:

one or more memories; and

one or more processors coupled to the one or more memories, the one or more processors configured:

to determine a quantization transform corresponding to a geometric object, the geometric object representing at least a portion of the three-dimensional scene, the quantization transform useable for converting a floating point space to a fixed point space, wherein the floating point space contains one or more floating point data corresponding to the geometric object; and

to convert, by using the quantization transform, the one or more floating point data to one or more fixed point data.

16. An article of manufacture for representing a three-dimensional scene using fixed point data, the article of manufacture comprising:

a computer readable medium containing one or more programs which when executed implement the steps of:

determining a quantization transform corresponding to the geometric object, the geometric object representing at least a portion of a three-dimensional scene, the quantization transform useable for converting a floating point space to a fixed point space, wherein the floating point space contains at least a portion of the three-dimensional scene; and

converting, by using the quantization transform, the one or more floating point data to one or more fixed point data.

17. A method for representing a three-dimensional scene using fixed point data, the method comprising the steps of:

determining a quantization transform corresponding to a geometric object, the geometric object representing at least a portion of the three-dimensional scene, the quantization transform suitable for converting a floating point space to a fixed point space, wherein the fixed point space contains one or more fixed point data corresponding to the geometric object and the floating point space defines at least the portion of the three-dimensional scene; and

applying at least the quantization transform to the one or more fixed point data.

18. The method of claim 17, wherein the step of determining a quantization transform further comprises the step of reading the quantization transform from a file, wherein the file comprises the quantization transform and the one or more fixed point data corresponding to the geometric object.

19. The method of claim 17, wherein a file comprises a plurality of geometric objects, and wherein the method further comprises the steps of:

parsing the file; and

creating a scene graph from the parsed file.

20. The method of claim 19, wherein:

the scene graph comprises a plurality of nodes, at least some of the nodes being interconnected;

the file comprises an inverse transform corresponding to at least one given geometric object, the inverse transform previously determined from a concatenation of one or more ModelView transforms, each ModelView transform comprising one or more of scale, rotate, and translate data, and a previously computed quantization transform;

the method further comprises the step of traversing the scene graph; and

the step of applying further comprises the step of, when a node corresponding to the given geometric object is reached, applying at least the inverse transform to one or more fixed point data corresponding to the given geometric object.

21. The method of claim 20, wherein:

the method further comprises the step of, when a node corresponding to a transform node is reached determining a ModelView transform comprising one or more of scale, rotate, and translate data;

the step of applying further comprises the steps of:

concatenating at least the ModelView transform, the quantization transform, and the inverse transform to create a concatenated transform; and

applying the concatenated transform to the fixed point data to create display data.

22. The method of claim 21, further comprising the step of rendering the display data on a display.

23. The method of claim 17, wherein the step of determining a quantization transform further comprises the step of determining a bounding sphere defining extents of the floating point space represented by the geometric data in the three-dimensional scene.

24. The method of claim 23, wherein the step of determining a quantization transform further comprises the steps of:

determining extents of the bounding sphere; and

mapping the extents of the bounding sphere to data having values falling between first and second integer values.

25. The method of claim 24, wherein the step of determining extents of the bounding sphere further comprises the step of computing at least one minimum vertex value and at least one maximum vertex value for all geometric objects in at least the portion of the three-dimensional scene.

26. The method of claim 24, where the step of mapping uses a radius of the bounding sphere, a center of the bounding sphere, and maximum and minimum short integer values.

27. An apparatus for representing a three-dimensional scene using fixed point data, the apparatus comprising:

one or more memories; and

one or more processors coupled to the one or more memories, the one or more processors configured:

to determine a quantization transform corresponding to a geometric object, the geometric object representing at least a portion of the three-dimensional scene, the

quantization transform suitable for converting a floating point space to a fixed point space, wherein the fixed point space contains one or more fixed point data corresponding to the geometric object and the floating point space defines at least the portion of the three-dimensional scene; and

to apply at least the quantization transform to the one or more fixed point data.